BETTER BEANS THROUGH GENOMICS:
ACCELERATING RWANDAN BREEDING WITH MOLECULAR MARKERS

Common bean has been identified as a priority food and nutritional security crop for Eastern and Central Africa (ECA). This predominantly women's crop is a major source of protein and nutrients, with Rwanda being the largest per capita consumer. The Rwanda Agriculture Board (RAB) has a strong bean breeding programme and is beginning to integrate molecular markers to accelerate the production of improved varieties. Through the Africa Biosciences Challenge Fund (ABCF) and the BecA-JIC Alliance, a RAB bean breeder is working at the BecA-ILRI Hub to isolate markers using Next Generation Sequencing (NGS) for integration into the Rwandan bean breeding programme and beyond.

Challenge

Common bean represents a key avenue to reducing nutritional insecurity in Rwanda. The national bean program and their partners have significantly increased bean production and nutritional content in farmer-preferred varieties over the last 10 years. Introduction of molecular markers for traits such as disease resistance and micronutrient content would accelerate the process.

Approach

The project will be completed in three phases

1. Re-sequencing donor parental varieties carrying specific traits such as higher iron and disease resistance (ABCF).
2. Bulk segregant analysis/genotyping-by-sequencing of populations produced by RAB that are segregating for disease resistance and seed iron content (ABCF).
3. Integration of markers into the RAB breeding programme for faster production of farmer preferred varieties (RAB).

Objectives

1. Genome sequence of important parental varieties
2. Molecular markers for the Rwandan bean breeding programme for traits of interest, including disease resistance and high micronutrient content.

Collaborative Partnership

Rwanda Agriculture Board: Doreen Mutoni (ABCF)

BecA-JIC: Tilly Eldridge

JIC: Cristobal Uauy

BecA-ILRI Hub: Jagger Harvey

RAB breeders showcasing their work to International Center for Tropical Agriculture and Pan African Bean Research Alliance collaborators

Expected outputs and impact pathway

1) Molecular markers → breeding program(s)
2) Sequencing local varieties → reference and resource for additional economically important traits
3) Information for use in RAB and other breeding programs in the region.

Over half of Rwandan farmers have received RAB-improved bean varieties, under Ministry of Agriculture and Animal Resources activities (714,000 households). Integration of molecular breeding will accelerate these efforts, enabling quicker development and release of higher yielding, nutritionally improved varieties. This will enhance the impact of this already effective program for smallholder farmers and consumers in Rwanda and beyond.

To learn more about this project, contact:

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